American Mineralogist, Volume 70, page 1320, 1985

Mixing properties of aluminosilicate garnets: constraints from natural and experimental data, and applications to geothermo-barometry: Clarifications

JIBAMITRA GANGULY

Department of Geosciences
University of Arizona, Tucson, Arizona 85721

AND SURENDRA K. SAXENA

Department of Geology
Brooklyn College, C.U.N.Y., Brooklyn, New York 11210

In this paper (Ganguly and Saxena, 1984) we have developed a restricted formulation for garnet–biotite geothermometry by introducing certain corrections for compositional effects on the K_D(Fe–Mg) vs. T calibration of Ferry and Spear (1978) in the Fe–Mg system. To use this formulation, one needs to evaluate, according to (14), the compositionally dependent interaction parameter W^{Gt}_{FeMg} in equations (12) and (13) for the garnet composition in the sample of interest and for that ($Alm_{90}Py_{10}$) maintained in the experimental work of Ferry and Spear, respectively. Thus, W^{Gt}_{FeMg} (eqn. 13) $\approx$ 2270 cal, and consequently, the term A(eqn. 12) $\approx 1175 + 9.45\ P$(kbar). The term W_{Mn} in equation (12) is to be read as ΔW_{Mn}.

The W parameters in equations (A.1) and (A.2) in the Appendix are W_G's (see eqn. 5). The equation (A.3) is for 1 bar, T. $RT\ln\gamma_{Ca}$(Gt) at $P > 1$ bar can be calculated through the relation $RT\partial\ln\gamma_i/\partial P = (\bar{V}_i - V_i^\circ)$. The volume data for grossular are given in Newton and Haselton (1981), and those for pyrope in Haselton and Newton (1980).

Acknowledgments

Thanks are due Drs. Michael Holdaway and Barbara Dutrow for checking the clarity of the 'clarifications', and to Dr. Dexter Perkins for drawing attention to the eqns. (A.1) and (A.2).

References

Ferry, J. M. and Spear, F. S. (1978) Experimental calibration of partitioning of Fe and Mg between biotite and garnet. Contributions to Mineralogy and Petrology, 66, 113–117.

Ganguly, J. and Saxena, S. K. (1984) Mixing properties of aluminosilicate garnets: constraints from natural and experimental data, and applications to geothermo-barometry. American Mineralogist, 69, 88–97.

Haselton, H. T. and Newton, R. C. (1980) Thermodynamics of pyrope-grossular garnets and their stabilities at high temperatures and pressures. Journal of Geophysical Research, 85, 6973–6982.

Newton, R. C. and Haselton, H. T. (1981) Thermodynamics of the garnet–plagioclase–Al_2SiO_5–quartz geobarometer. In R. C. Newton et al., Eds., Advances in Physical Geochemistry, Vol. 1, p. 131–148. Springer-Verlag.

0003–004X/85/1112–1320$02.00